SYSTEMATICS OF THE AMPHI-ATLANTIC BAMBUSOID GENUS *STREPTOGYNA* (POACEAE)[1]

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ABSTRACT

Streptogyna is the only herbaceous bamboo genus with an amphi-Atlantic distribution. *Streptogyna crinita* occurs in tropical Africa, Sri Lanka, and India, and *S. americana* is found throughout the Neotropics. Although marked differences in habit and in morphology of lodicules and starch grains suggest segregation at the generic level, they are here retained in a single genus because they are quite similar in spikelet morphology and leaf anatomy. Multicellular microhairs are present on the lodicules of *S. crinita* and mark the first report of microhairs in the genus. Multicellular microhairs are otherwise well developed in the grasses only in the African herbaceous bamboo *Guaduella,* and they may be a primitive feature in the family as they are common in its putative outgroup, the Joinvilleaceae. *Streptogyna* shows strong bambusoid affinities in its ligule and leaf anatomy, spikelet structure, caryopsis and embryo morphology, and chromosome number, but differs from the core group of the subfamily in its seedling morphology and lack of epidermal papillae. Autapomorphies in the two species suggest that neither could have been derived directly from the other.

The grass genus *Streptogyna* was first brought to the attention of Western botanists in the late 18th century, when British and Swedish collectors brought back specimens of "rat-catching grass" from the forests of West Africa. A gathering from Nigeria by Palisot de Beauvois was used as the basis for *Streptogyna* in 1812, which he based on the only species known to him, *S. crinita.* The narrow leaves and many-flowered spikelets of *Streptogyna* were long taken as indications of pooid (festucoid) affinities. Thus, Bentham (1883), Hackel (1887), and Hubbard (1936) all considered that the proper disposition of this genus from the tropical rainforest lay with this large, temperate-region grass group. But there were dissenters, and Nees von Esenbeck (1835) and Steudel (1855), for example, suspected the bambusoid affinities of the genus. *Streptogyna* was briefly revised by Hubbard (1956), who indicated that the group deserved tribal status, but it was not until Tateoka (1958a) and Metcalfe (1960) examined its leaf anatomy that the bambusoid affinities of *Streptogyna* became clear. Recent workers agree that *Streptogyna* should be placed in its own tribe in the Bambusoideae (Calderón & Soderstrom, 1980; Clayton & Renvoize, 1986). In a treatment of the herbaceous bamboos of Sri Lanka, Soderstrom et al. (1987) offered a detailed descriptive account of the leaf-blade anatomy in the two taxa. The present study provides a revision of the genus and attempts to clarify the relationships of the two species by examining characters that have not yet been studied in detail, such as morphology of lodicules, starch grains, and embryos.

MATERIALS AND METHODS

Specimens of *Streptogyna* were examined from the following herbaria: AAU, B, BM, BR, CAY, CEPEC, F, G, ISC, K, M, MO, NA, NY, P, PDA, RB, S, US, W, and WIS. For anatomical studies, spikelets, leaves, and embryos (Table 1) were dehydrated in dimethoxypropane, infiltrated with tertiary butanol, embedded in wax, sectioned using a rotary microtome, and stained in chlorazol black E. Lodicules were rehydrated with Aerosol-OT before examination. Starch grains from caryopses were cut on a freezing microtome and stained with I_2KI. Observations of living plants of *Streptogyna* were made by Soderstrom in Brazil (March 1972, and May 1976) and by Jud-

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TABLE 1. Specimens of *Streptogyna* for which embryos (e), floret bases (using the scanning electron microscope) (f), lodicules (l), and starch grains (s) were examined.

S. crinita

CAMEROON: *Buesgen 530* (1) (US). GABON: *without collector*, Limbareni, May 1875 (1) (US). GUINEA-BISSAU: *Espirito Santo Expedition 3735* (1) (US). INDIA: *Wight 2362* (l, s) (PDA). IVORY COAST: *Bamps 2175* (e, s) (BR). LIBERIA: *Baldwin 6305* (1) (US). SIERRA LEONE: *Fairchild s.n.*, Jan. 1927 (e, l, s) (US). SRI LANKA: *without collector*, 3 Jan. 1881, Henaratgoda (1) (PDA); *Senaratna 2700* (1) (PDA); *Gardner s.n.*, Dec. 1846 (1) (PDA). ZAIRE: *Gilbert 14213* (s) (BR); *Lebrun 605* (e, l, s) (P); *Mullenders 1226* (s) (BR); *Vanderyst 993* (1) (P).

S. americana

BRAZIL: *Eiten & Eiten 8903* (1) (US); *Prance et al. 6454* (l, e) (US); *Prance et al. 6527* (l, s) (US); *Swallen 5089* (l, s) (US); *Soderstrom 2193* (e, l, s) (US). COLOMBIA: *Blydenstein 1687* (1) (US); *Idrobo & Schultes 608* (l, s) (US). FRENCH GUIANA: *Broadway 771* (1) (US). GUATEMALA: *Weatherwax 104* (e, s) (US). SURINAM: *Maguire 54093* (1) (US). TRINIDAD: *Hitchcock 10122* (1) (US). VENEZUELA: *Steyermark 86760* (1) (US).

ziewicz in Panama (March 1983). A Cambridge 35 scanning electron microscope was used to examine the lemmas of *Streptogyna* species.

RESULTS

Vegetative morphology. *Streptogyna* species are herbs of the rainforest understory and are less than one meter in height. *Streptogyna crinita* has long sympodial rhizomes that are densely covered with striate scale leaves, and the erect culms are leafy, bearing lanceolate leaves along most of their length (see figure in Soderstrom et al., 1987). *Streptogyna americana* is densely cespitose with the culms produced from short, nonscaly, sympodial rhizomes, and the linear leaves are all borne near the base of the plant (Fig. 6A). The leaves of *S. crinita* have glabrous sheaths while those of *S. americana* are hispid near the summit (Fig. 6B). At the summit of the sheath are borne membranous flanges that have been called lateral appendages (Tran Van Nam, 1972), as they appear to arise from a meristem independent of the sheath. These and the oral setae are moderately well developed in *S. crinita* but inconspicuous or absent in *S. americana*. Both species also have an indurate abaxial rim at the summit of the sheath (external ligule), and the leaf blades are deciduous above this structure. A short, membranous inner ligule is present in both taxa. The narrow leaf blades of *S. americana* are strictly glabrous, whereas the broader blades of *S. crinita* may have a scattering of long, delicate macrohairs on the adaxial epidermis.

Inflorescence. The panicle of *Streptogyna* species is spikelike, but in both species individual plants have been seen in which an additional floriferous branch is borne at the base of the main axis of the inflorescence. The inflorescence of *S. crinita* is generally shorter than that of *S. americana* and appears to be more densely flowered; this appearance is due in part to the larger glumes in *S. crinita*. Both species have loosely several-flowered spikelets (Fig. 6D) with the uppermost florets successively smaller and sterile and with a peculiar downward prolongation of the base of each floret, which, however, does not appear to be an elaisome, as no oil was detected within it. The glumes of *S. crinita* are broad, elliptic, and have many nerves, while those of *S. americana* have few nerves and are linear to lanceolate (Fig. 6E, F). The florets of both species are indurate and fall attached to a pointed, persistent rachilla internode (Fig. 6G) that presumably aids in external animal dispersal. In *S. crinita* the base of the floret is pilose and in the scanning electron microscope (SEM) the bulk of the epidermis, which appears granular through the light microscope, is composed of short prickles alternating with square to rectangular cells in a sharply defined pattern (Fig. 1a, b). The rectangular cells were observed to deflate when placed under the electron beam of the SEM. The lemmas of *S. americana* are glabrous and the epidermis is apparently covered by a thick cuticle that obscures the rounded prickles and intercalated rectangular cells (Fig. 1c, d). The lemmas of both species have long, antrorsely scabrous awns. The paleas are strongly bikeeled (Fig. 2a).

Flowers. The flowers of both species have three relatively large lodicules (Fig. 3). Those of *S. crinita* are spatulate, of firm texture throughout, and are strongly nerved until near the summit (Fig. 3A). Microscopically the epidermis of the upper portion of each lodicule consists of a uniform network of polygonal cells with moderately

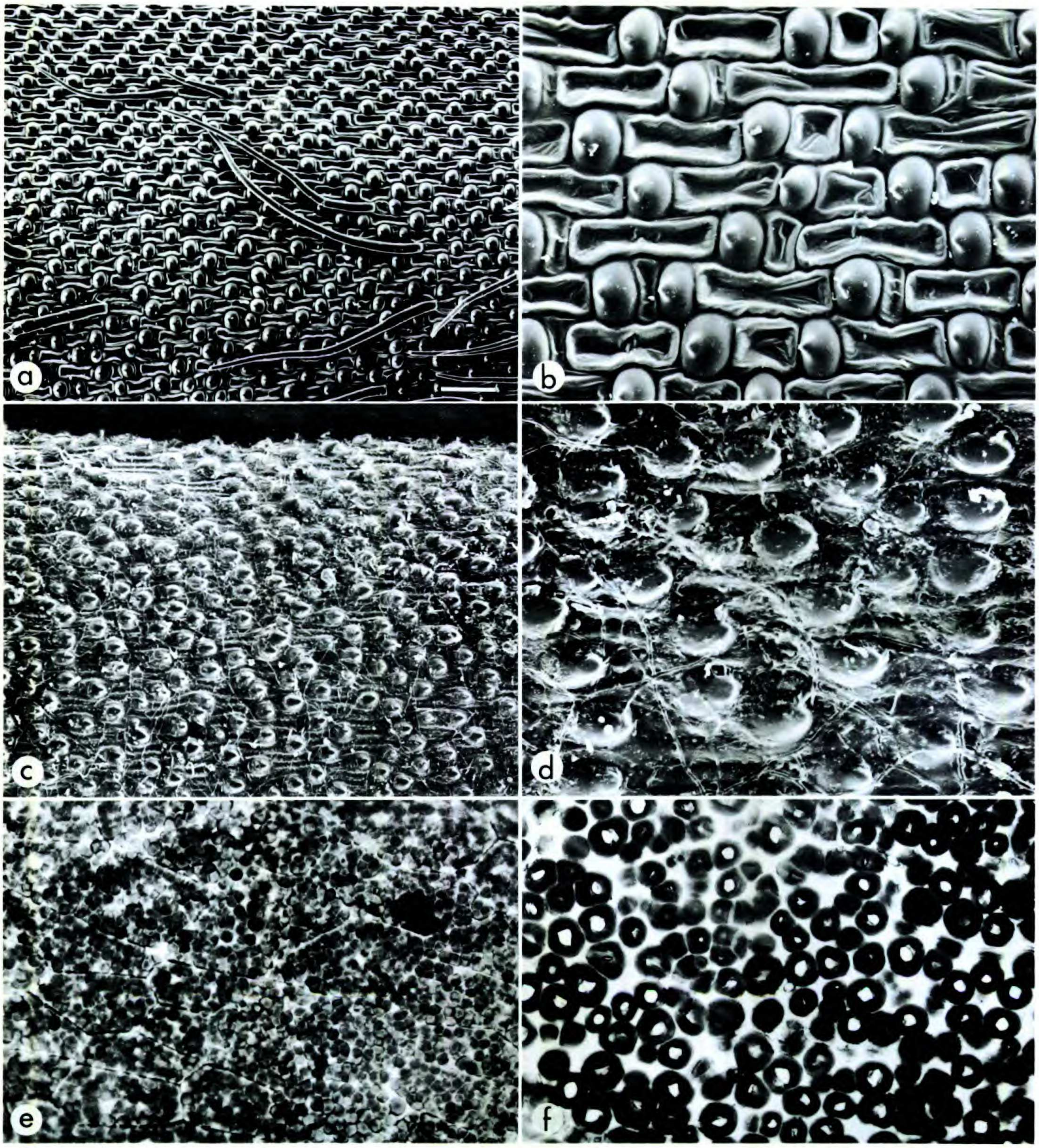

FIGURE 1. Scanning electron micrographs of the base of lemmas (a–d) and endosperm starch grains (e–f) of *Streptogyna*.—a, b. *S. crinita*, showing alternating prickles and deflated rectangular cells.—c, d. *S. americana*, showing prickles and intercalated cells obscured by thick cuticle.—e. *S. crinita*, showing small, moderately compound grains with few granules per grain.—f. *S. americana*, showing large, mostly simple grains. (a, b based on Sierra Leone, 20 Jan. 1927, *Fairchild s.n.* (US); c based on Mexico, *Orcutt 2933* (US); d based on Colombia, *Idrobo & Schultes 608* (US); e based on Sierra Leone, *Afzelius and Smeathman s.n.* (BM); f based on Brazil, *Soderstrom et al. 2193* (US). Scale bar in a = 100 μm for a, c; 20 μm for b, d–f.)

thickened walls (Fig. 3B). The apices of the lodicules are fringed with about 5–15 thin-walled microhairs, and each hair contains 4–8 cylindrical cells. The basal cell is slightly longer than the apical cells and does not collapse when dried as do the apical cells. The longer lodicules of *S. americana* are narrowly lanceolate or linear and often are widest just below the middle (Fig. 3C). In their lower portions they are strongly nerved and of firm texture, but at about the middle of their length the vascular bundles end and the lodicule tapers gradually to a very delicate, hyaline apex. Most specimens have the apices and uppermost margins of the lodicules fringed with

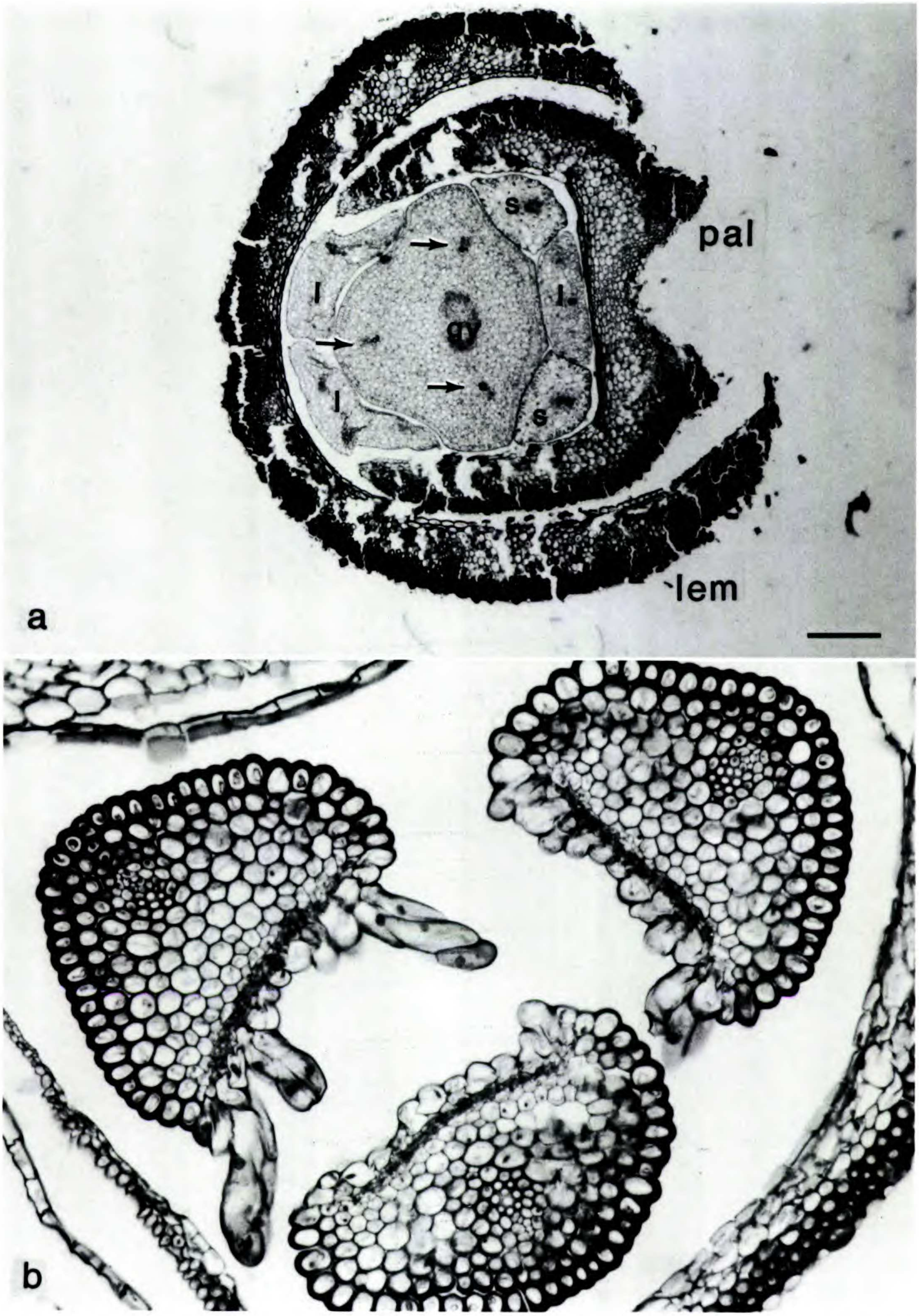

FIGURE 2. Floret anatomy of *Streptogyna americana*.—a. Transverse section through lower part showing lemma, palea, three lodicules (l), two stamens (s), and gynoecium (gy) with three stigmatic vascular bundles

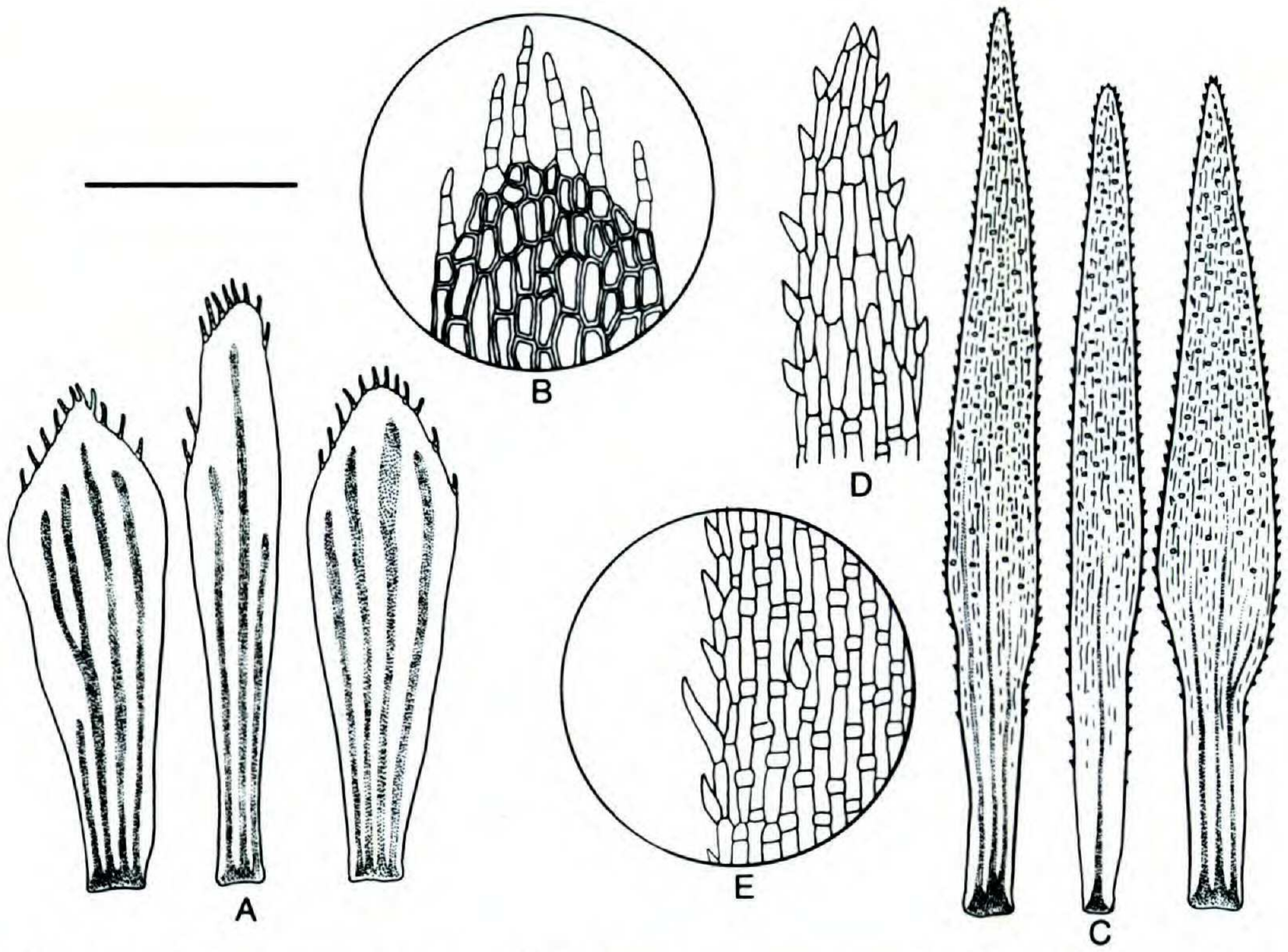

FIGURE 3. Lodicules of *Streptogyna crinita* (A, B) and *S. americana* (C–E).—A. Lodicules.—B. Detail of apex, showing multicellular microhairs and undifferentiated, thick-walled parenchyma cells on surface.—C. Lodicules.—D. Detail of apex.—E. Detail of upper portion of lodicule, showing prickles (mainly marginal) and short cells interspersed with long cells on surface. (*Streptogyna crinita* based on Cameroon, *Buesgen 530* (US); *S. americana* based on Trinidad, *Hitchcock 10122* (US). Scale bar = 1 mm for A, C; 0.2 mm for B, D, E.)

abundant prickles that occasionally grade into short cilia. The epidermis of the upper portion consists of alternating, thin-walled long and short cells, some of the latter modified into prickles (Fig. 3D, E). No bicellular or multicellular microhairs were observed on the lodicules of *S. americana*. The two stamens of both species are lateral anterior in position and are free to their bases (Figure 2a); the anthers are linear (Fig. 6M). The gynecium of *Streptogyna crinita* bears a single style branching into two stigmas, and the ovary is pilose near the summit. The stigmas, which are supplied by each of two lateral posterior vascular bundles in the ovary, are unusual in that they continue to grow after anthesis, elongating and producing stout retrorse barbs on their adaxial surfaces. *Streptogyna americana* has three stigmas (Fig. 6L) produced from three stigmatic bundles within the glabrous ovary (Fig. 2a). These stigmas also continue to grow after anthesis, elongating and producing short, papillate processes from a meristematic layer near the adaxial surface (Figs. 2b, 6N).

Fruit. Both species have a cylindrical, linear caryopsis with a linear hilum that extends the full length of the fruit (Fig. 6O, P). The mature endosperm starch granules of *S. crinita* are weakly to moderately coherent into masses of 3–6 that form individual grains 6–10 (rarely 15) μm in diameter (Fig. 1e). The starch grains of *S. americana* are nearly round, 10–30 μm in diameter, and are simple or rarely compounded into small masses (Fig. 1f). There is a prominent lacuna in the center of many of the grains. The embryo of *Streptogyna* species is small, basal, and when dissected out of the caryopsis is observed to be about one-half again as tall as it is wide. In median sagittal sections the embryos of *S. americana* (Fig. 4b) sampled had a prominent epiblast, no mesocotyledonary internode, and a small cleft between the scutellum and coleorhiza. In transverse sections the coleoptile had two lateral nerves and fused margins, the first embryonic leaf had five nerves and strongly overlapping margins, and the scutellum had three vascular traces (Fig. 4d). *Streptogyna crinita* had a similar embryonic

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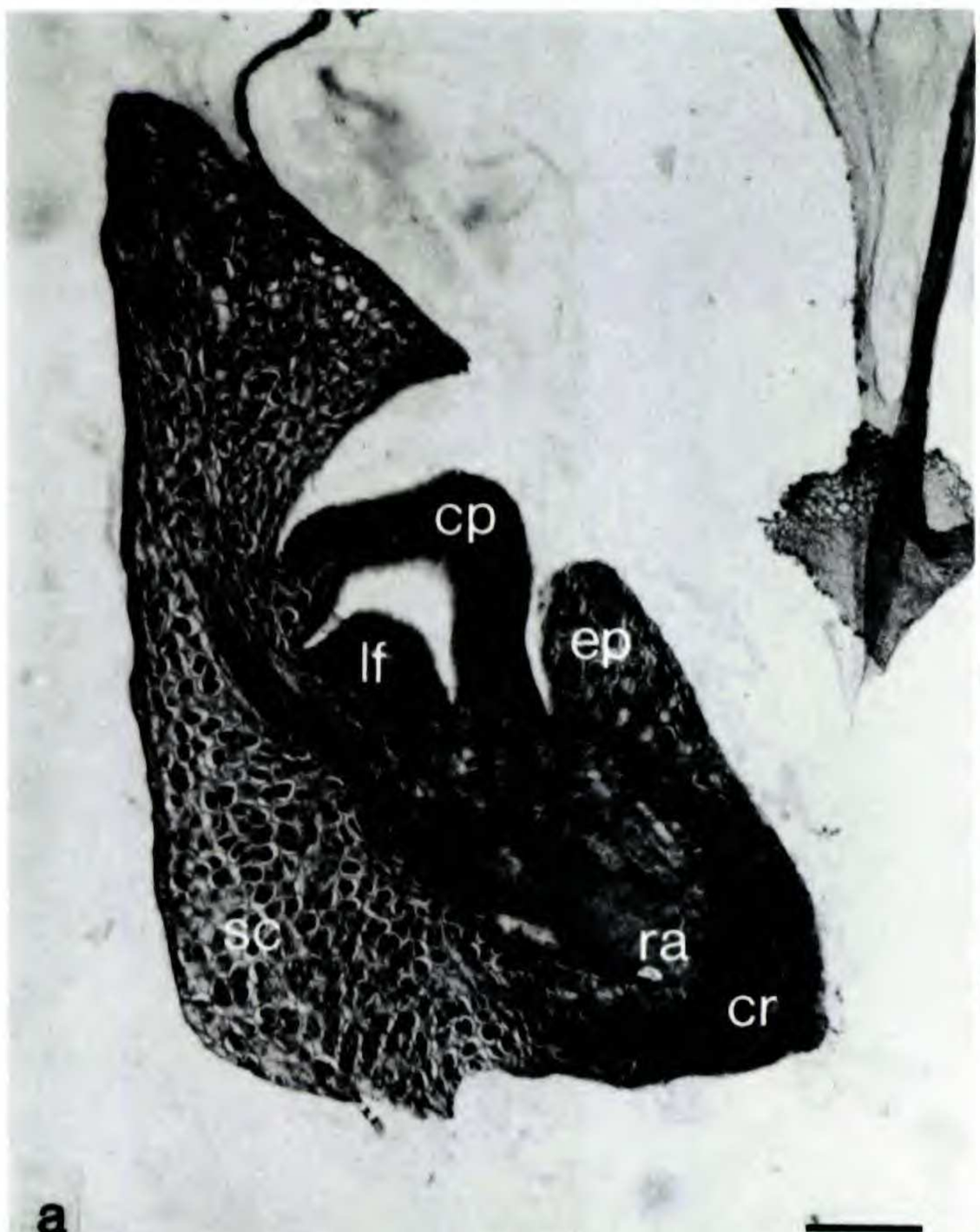
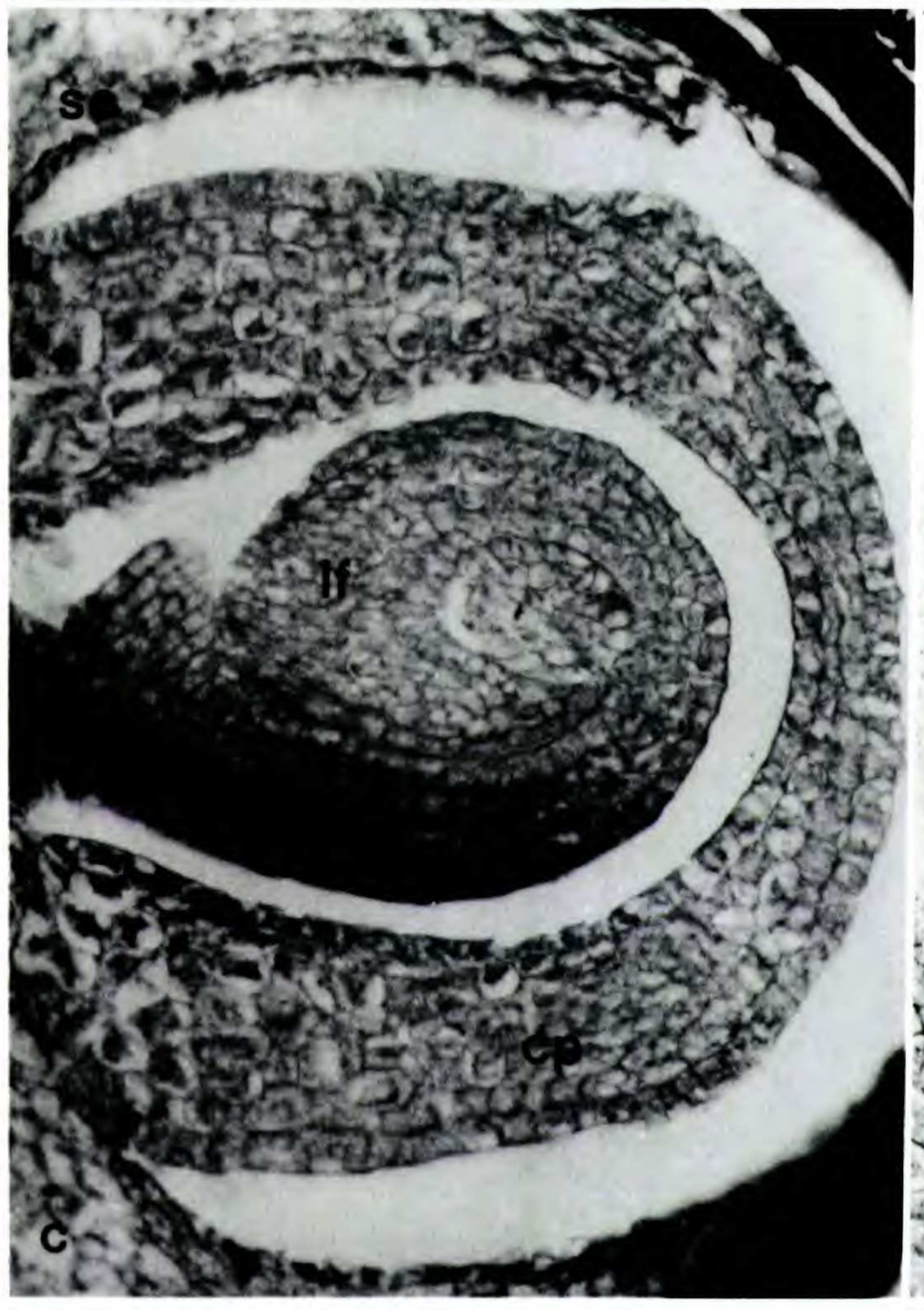
(arrows).—b. Transverse section through upper part showing three stigmas with papillae arising from meristematic regions on adaxial surfaces. (Based on Brazil, *Soderstrom et al. 2193* (US). Scale bar: a = 100 μm; b = 25 μm.)





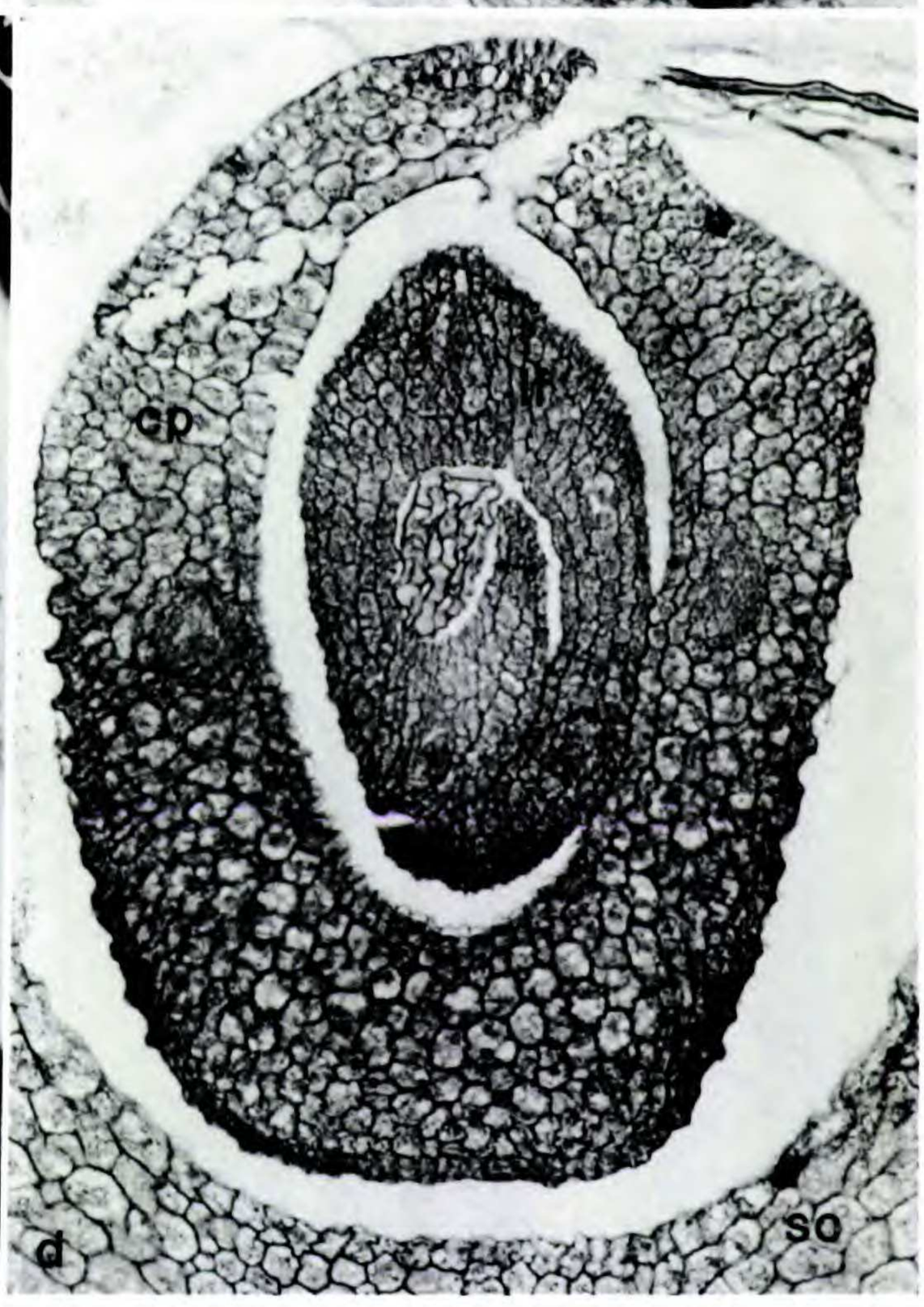


FIGURE 4. Embryo morphology of *Streptogyna* species.—a. *S. crinita,* median sagittal section showing inconspicuous cleft between scutellum and coleorhiza.—b. *S. americana,* median sagittal section showing small but distinct cleft (arrow) between scutellum and coleorhiza.—c. *S. crinita,* transverse section through plumule showing overlapping margins of first embryonic leaf; plumule is attached to scutellum on left.—d. *S. americana,* transverse section through plumule showing overlapping margins of first embryonic leaf; plumule is attached to scutellum on bottom. (a based on Zaire, *Lebrun 605* (US); b, d based on Brazil, *Soderstrom et al. 2193* (US); c

TABLE 2. Comparison of *Streptogyna crinita* with *S. americana*.

Character	*S. crinita*	*S. americana*
Distribution	Tropical Africa, Sri Lanka, India	Tropical America
Habit	Rhizomatous; leaves spaced along culm	Cespitose from short, knotty rhizomes; leaves clustered at plant base
Ligular area	Sheath summit glabrous; sheath auricles and oral setae conspicuous	Sheath summit hispid; sheath auricles and oral setae inconspicuous
Morphology of leaf blade	Lanceolate, 18–29(–40) cm long, 1–2.5 cm wide	Linear, 50–78 cm long, 0.8–1.6(–2.4) cm wide
Upper surface of leaf blade	Nerves slightly raised; glabrous or sparingly pilose	Nerves not raised; glabrous
Inflorescence	11–29 cm long, the spikelets overlapping	25–40(–67) cm long, the spikelets not overlapping
Glumes	Large; first glume 6–8 mm long, the second 17–26 mm long, 11–17-nerved	Small; first glume 3–12 mm long, the second 12–16 mm long, 7–9-nerved
Lemma	Base pilose; texture granular, the epidermal cells distinct in SEM	Base glabrous; texture smooth, the epidermal cells obscure in SEM
Lodicules	Oblanceolate, 1.5–3.5 mm long; multicellular microhairs present; prickles rare or absent; short cells absent; texture near apex firm	Linear, 3–6 mm long; multicellular microhairs absent; prickles abundant; short cells present; texture near apex hyaline
Ovary	Pilose near summit	Glabrous
Stigmas	2, retrorsely barbed	3, with soft, short hairs
Starch grains	Compound, individual granules 6–10(–15) μm in diameter	Simple, grains 10–30 μm in diameter
Embryo	Cleft between scutellum and coleorhiza not conspicuous	Cleft between scutellum and coleorhiza distinct
Seedling	Unknown	First leaf linear, erect
Chromosome number	$n = 12$	Unknown

structure except that the cleft between the scutellum and coleorhiza was less conspicuous, often present merely as an embayment on the lower side of the embryo (Fig. 4a).

DISCUSSION

Despite the statement of Jacques-Félix (1962) that there is little difference between the species, the Afro-Asian *Streptogyna crinita* and American *S. americana* are quite distinct from each other in a number of characters (Table 2). The long, scaly, flagelliform sympodial rhizomes of *S. crinita* are rare in herbaceous bamboos, a similar type being found only in some olyroids such as *Pariana parvispica*. The divergence in lodicule morphology (Fig. 3) between the species is great and in most grass taxa would imply separation at the genus level. Microhairs are not found on the foliage of either species (Tateoka, 1958a; Metcalfe, 1960; Jacques-Félix, 1962; Renvoize, 1985; Soderstrom et al., 1987), but this study has found them to be present on the lodicule apices of *S. crinita,* where they are multicellular and resemble those found on the foliage (Metcalfe, 1960; Jacques-Félix, 1962) and lodicules (pers. obs.) of the African herbaceous bamboo genus *Guaduella* (Guaduellae). Multicellular microhairs are also found on the foliage (Smithson, 1956) and floral bracts (pers. obs.) of species of *Joinvillea* (Joinvilleaceae), a group often considered to be among the closest relatives of the grasses (Stebbins, 1982; Dahlgren et al., 1985; Campbell & Kellogg, in press). Multicellular microhairs, consisting of three or more thin-walled cells, and with a blunt distal cell, have also been noted in the olyroid bamboos *Maclurolyra tecta* (Calderón & Soderstrom, 1973), *Diandrolyra tatianae*

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based on Ivory Coast, *Bamps 2175* (BR). Abbreviations: cp, coleoptile; cr, coleorhiza; ep, epiblast; lf, first embryonic leaf; ra, radicle; sc, scutellum. Scale bar: a, b = 100 μm; c, d = 25 μm.)

(pers. obs.), the woody bamboo *Arundinaria vagans* (Metcalfe, 1960), as well as in several other woody bamboo genera such as *Pleioblastus* and in several species of the arundinoid genus *Danthonia* (Tateoka & Takagi, 1967). The presence of microhairs on the lodicules but not on the foliage of *S. crinita* provides an exception to the generalization of these authors that only grasses with microhairs on their leaves also exhibit them on their lodicules. Tateoka & Takagi also illustrated a typical woody bamboo (*Sasa* species) lodicule with cilia, prickles, short and long cells, and bicellular microhairs that in many ways represents a composite of the features found in the two *Streptogyna* species. The lodicules of *S. americana* possess abundant marginal prickle hairs (which occasionally grade into short cilia) and have surfaces that are differentiated into long and short cells in the upper portions. In *S. crinita,* prickles are rare and cilia and short cells are absent on the lodicules, but microhairs are present.

The two species differ in stigma number and morphology. *Streptogyna americana* possesses three merely papillose stigmas, whereas *S. crinita* has two stigmas that are coarsely armed with retrorse barbs. However, in both taxa the stigmas elongate after anthesis, becoming entangled with each other and with the lemma awns. Reports of three stamens in at least some florets of both *Streptogyna* species (Doell, 1880; Bentham, 1883; Jacques-Félix, 1962) could not be confirmed in this study.

Streptogyna crinita consistently has small, weakly to moderately compound starch grains (Fig. 1e). This agrees with the descriptions of Jacques-Félix (1962) and also Yakovlev (1950), neither of whom cite specimens. The starch grains of *S. americana* are larger and essentially simple (Fig. 1f). Starch grain characters are not as reliable as anatomical or cytological data, but they have been considered to be taxonomically useful at the tribal level (Tateoka, 1962). Most bambusoids, as well as *Joinvillea* (pers. obs.), possess compound starch grains.

The two species of *Streptogyna* are similar in embryo structure (Fig. 4). Both possess typically bambusoid embryos with a formula of F+PP (see Reeder, 1962); that is, no internode is present between the divergence of the scutellar and coleoptilar vascular traces (F), an epiblast is present (+), a cleft between the lower part of the scutellum and the coleoptile is present (P), and the margins of the first embryonic leaf overlap (P). Jacques-Félix (1962) illustrated an embryo of *S. crinita* with no internode between the scutellar traces (F), an epiblast present (+), and lacking a cleft between the scutellum and coleorhiza (F), but in all individual embryos of the specimens that we examined a small embayment was present at the base of the embryo that could be interpreted as a cleft, although it was not as prominent as in *S. americana.* In transverse sections the embryos of both species had a first embryonic leaf with strongly overlapping margins (P). The embryo of both species is unusual among the Bambusoideae examined in that it is distinctly taller than it is wide.

CONCLUSIONS

Many grass genera occur in both the Old and the New World, but only very few tropical-forest Poaceae have this type of bihemispheric distribution pattern. Among the woody bamboos, *Arundinaria* and *Bambusa* (both Bambuseae), taken in their widest sense, have been considered to range across the Atlantic Ocean. However, studies of these groups by Soderstrom, Ellis, and collaborators are revealing them to be heterogeneous assemblages, and it appears *Bambusa* cannot be considered to exhibit a true amphi-Atlantic distribution. Among the herbaceous bamboos, only *Olyra* and *Streptogyna* occur both in South America and in the Old World, but *Olyra latifolia* is a widespread, weedy species that was almost certainly introduced by humans into Africa from South America quite early. Therefore the only bamboo genera with amphi-Atlantic distributions are *Streptogyna* and possibly *Arundinaria.*

Streptogyna differs from the bambusoid core group (Soderstrom & Ellis, in press) principally in details of seedling morphology (the first expanded blade of *S. americana* is narrow and vertical, not broad and horizontal as in all other bambusoids; Soderstrom, 1981) and lack of epidermal papillae, microhairs, and well-developed arm cells. Of these divergences, the distinctive seedling morphology is perhaps the most significant (see Kuwabara, 1960), but the seedling of *S. crinita* has not yet been examined. *Streptogyna* resembles the woody bamboos in possessing many-flowered spikelets, strongly developed fusoid cells, an adaxially projecting leaf blade midrib with complex vasculature, multicellular microhairs (as noted, present in *Guaduella* and several woody bambusoid genera), lateral appendages (Tran Van Nam, 1972), oral setae, and

especially an external ligule and deciduous leaf blades. It may be noted that the multicellular microhairs of *Guaduella* species occur on both the leaf blades (throughout) and lodicules (on apices only) and that the basal cell is very long, about half the total length of the hair. *Streptogyna crinita,* in contrast, has uniseriate microhairs in which the basal cells are not conspicuously longer than the upper cells. Cytologically, *Streptogyna crinita* is similar to the bambusoids and has a basic chromosome number of $n = 12$, as reported by Veyret (1958), Tateoka (1958b, 1965), Kammacher et al. (1973), and Dujardin (1978), who studied material from Sri Lanka, Uganda, the Ivory Coast, and Zaire, respectively. *Streptogyna americana* has not been studied cytologically.

The generalization that microcharacters in the grass family are often more useful in generic, tribal, and subfamilial delimitations than are macrocharacters such as spikelet morphology because microcharacters are under less intense selective pressure thus finds an exception in the case of *Streptogyna.* In this genus, floret morphology, with its special adaptations to external animal dispersal (Ridley, 1930; van der Pijl, 1982; Soderstrom et al., 1987) is clearly a conservative feature. The leaf anatomy of the two species is quite similar, and one of the only consistent differences between the two is the presence of more prominent adaxial ribs over the veins in *S. crinita* (Soderstrom et al., 1987) and the occasional presence of adaxial ciliate macrohairs in the latter species.

We have shown that in the habit, lemma texture, starch grain morphology, and especially the lodicule structure the two *Streptogyna* species are quite different from each other, to the extent that segregation at the generic level might be seriously considered. Based on a comparison with *Joinvillea* and most Bambusoideae, it appears that the absence of multicellular microhairs on the lodicules of *S. americana* represents a more specialized condition than their presence in *S. crinita,* and conversely the two stigmas of *S. crinita* are probably derived from three, which *S. americana* retains. It seems likely that both species evolved from an extinct ancestor and that their separation is ancient. However, barring strong differences in leaf anatomy and cytology, grasses are traditionally segregated into genera on the basis of gross spikelet morphology, and the spikelet and floret structures of the two species of *Streptogyna* are quite similar, as is the leaf anatomy. It will be necessary to study the seedlings of *S. crinita* and the cytology of *S. americana* before a final decision can be made on the taxonomic level at which these two sibling species should be recognized.

Taxonomic Treatment

Streptogyna Palisot de Beauvois, Essai Agrost. 80. 1812. TYPE SPECIES: *S. crinita* P. Beauv.
Streptia Rich. ex Doell in Mart., Fl. Bras. 2(3): 171. 1880. Nomen nudum.

Perennial forest grasses; culms solid, unbranched above the base; leaf sheaths strongly ribbed, extending upward along both sides of the pseudopetiole and contiguous with the inner ligule; outer ligule present as a short, indurate rim; inner ligule short, membranous; lateral appendages and oral setae present at summit of leaf sheath; leaf blades deciduous, linear to lanceolate, narrowed below into a short pseudopetiole, the nerves parallel or very slightly oblique from the midvein at its base; midvein and primary nerves manifest only on the abaxial (lower) surface, the secondary lateral nerves and transverse veinlets inconspicuous; leaf margins antrorsely scabrous. Inflorescence pedunculate, a spikelike panicle, unbranched or occasionally with a spikelike branch at the base; rachis 3-angled, one side convex and the other sides concave and alternately bearing the spikelet pedicels. Spikelets short-pedicelled, greenish, several-flowered, the lower florets well developed, somewhat laterally compressed, hermaphrodite, the upper ones progressively smaller and sterile, disarticulation occurring between the fertile florets, each of these falling attached to the extended curved rachilla segment above it; glumes 2, membranous, persistent, many-nerved, the first shorter than the second and attached to the side of the thickened pedicel that supports the second glume; second glume convolute and enclosing the lowest floret at its base; lemmas narrow, elongate, awned, many-nerved, inrolled, indurate, the base extended beyond the attachment of the floret into a stipelike, oblique callus, the apex bearing a long, antrorsely scabrous awn; paleas strongly 2-keeled, sulcate between the keels; lodicules 3, elongate, strongly nerved; stamens 2, lateral anterior, the anthers basifixed; ovary with a long style; stigmas 2 or 3, becoming hardened and persistent, intertwined at maturity with the stigmas of other florets in the same spikelet and

inflorescence; fruit a linear caryopsis, the hilum narrow, extending nearly the entire length of fruit, the embryo small, basal. Basic chromosome number, $n = 12$.

KEY TO THE SPECIES OF *STREPTOGYNA*

1a. Plant with long, scaly rhizomes; stigmas 2, retrorsely barbed; second glume 17–26 mm long; base of lemma pilose; leaf blades 10–25(–40) mm wide; paleotropical ..... 1. *Streptogyna crinita*

1b. Plant cespitose from short, knotty rhizomes; stigmas 3, subglabrous; second glume 12–16 mm long; base of lemma glabrous; leaf blades 8–16(–24) mm wide; neotropical ..... 2. *Streptogyna americana*

1. Streptogyna crinita P. Beauv., Essai Agrost. 80 + plate 16. 1812. TYPE: Nigeria: ["probably gathered in the forests of Oware or Benin" (Hubbard, 1956)] anno 1786–1788, *Palisot de Beauvois s.n.* (holotype, P, not seen).

Streptia crinita Rich., a herbarium name given as a synonym of *Streptogyna crinita* by Doell in Mart., Fl. Bras. 2(3): 172. 1880.

Streptia secunda Rich., a herbarium name given as a synonym of *Streptogyna crinita* by Doell in Mart., Fl. Bras. 2(3): 172. 1880.

Streptogyna gerontogaea Hook. f. in Trimen, Handb. Fl. Ceylon: 301–302. 1900. TYPE: Sri Lanka, without locality or collector, *C. P.* [*Ceylon Plants*] *922* (holotype, K!).

Culms 55–100 cm tall, each representing the aerial extension of an upturned sympodial rhizome, the culm itself producing at its base 1–3 additional rhizomes to 25 cm long, these with short internodes about 1 cm long covered by the overlapping sheaths; sheaths bladeless, ovate-lanceolate, strongly striate, 7–10 mm long. Leaves evenly distributed on culm, not overlapping; sheaths finely ciliate on the margins, otherwise glabrous; outer ligule 0.4–0.9 mm long, tipped by a fringe of ciliate hairs ca. 1 mm long; inner ligule 1–2 mm long, the upper margin erose, ciliate on the abaxial (outer) surface, glabrous on the adaxial surface; sheath auricles 1–2 mm long; lateral appendages 0.3–1.2 mm long; oral setae sparse, delicate, less than 1 mm long; pseudopetioles 5–15(–25) mm long; leaf blades narrowly to broadly lanceolate, 18–29(–40) cm long, 1–2.5(–4) cm wide, acute at the tip, narrowed below to the pseudopetiole, primary lateral veins 4–8 on each side of the midrib; upper blade surface pale green, glabrous or occasionally with scattered spinelike hairs; lower surface lighter green than the upper surface, glabrous. Inflorescence 11–29 cm long, borne on a peduncle 2–10(–40) cm long, erect at first, becoming strongly pendent with age; spikelets (11–)20–30(–42), the glumes of adjacent spikelets strongly overlapping; rachis appressed-pubescent. Spikelets on pedicels 0.8–1.7 mm long, 4–5(–7)-flowered; first glume 6.5–10 mm long, linear-lanceolate, glabrous, 1–3-nerved, transversely veined; second glume (16–)20–23 mm long, 1.7–2.5 mm wide, elliptic-lanceolate, glabrous, 11–17-nerved, the nerves of various thicknesses, not all extending the length of the glume, with numerous transverse veinlets, the terminal awn up to 2 mm long, or occasionally the apex emarginate; lemma of lowest floret 18–25 mm long, lanceolate, indurate except for the broad, scarious margins, 7(–9)-nerved, the callus 1.5–2.5 mm long, pilose, the terminal awn (12–)15–26 mm long; rachilla internode attached to base of lowest floret 3–4 mm long; palea about as long as the lemma, not conspicuously protruding from it; lodicules firmly membranous, narrowly obovate or spatulate, with a fringe of multicellular microhairs at the apex (rarely glabrous), the anterior pair 1.5–3.5 mm long, 1–5-nerved, the posterior pair often slightly longer, narrowly oblanceolate, 1–3-nerved; filaments weak and ribbonlike, the anthers pale yellow, about 4 mm long; ovary fusiform, long-ciliate on the upper third and lower part of the style; style long, flattened, with sparse appressed hairs; stigmas 2, strongly retrorsely barbed above, the barbed portions elongating and coiling with age; caryopsis 12–16 mm long, 0.8–1.2 mm wide, slightly tapering to a persistent, ciliate beak at its summit.

Additional specimens examined. ANGOLA. CABINDA (MAIOMBE): Buco Zau, *Gossweiler 6557* (BM, K). BENIN: Djougou, *Chevalier 23891* (P.). CAMEROON: Without locality, anno 1908–1909, *Buesgen 530* (US); Mbamkin, *Letouzey 2652* (BR); S de Dimako, rive droite de la rivière Mbonda, *Letouzey 2682* (BR); 38 km ESE Djoum, pres Akoafim, *Letouzey 8400* (B, K); E de Yokadouma, *Meijer 15146* (MO); N'Kolbrisson, ca. 8 km W of Yaoundé, *de Wilde 1205* (B, BR, K, MO); Yaoundé, *Zenker 533* (US). CENTRAL AFRICAN REPUBLIC: Fort Crampel to the Koddo, *Chevalier 6407* (P); Fort de Possel, *Chevalier 10552* (P); Manovo-Gounda-St. Floris National Park, 8 km S of Camp Koumbala at confluence of Mbingou and Koumbala, 8°26′N, 21°15′E, *Fay 4087* (K); Mbaïki, *le Testu 3446* (BM), *Tisserant 3446* (K). CONGO: Brazaville a St. Joseph, *Chevalier 27341* (K). EQUATORIAL GUINEA. CAMPO DISTRICT: Bebady, route from Anio, *Tessmann 658* (K). FERNANDO PO: anno 1859, *Mann 108* (K, W). ETHIOPIA. ILLUBABOR: E of Abobo, 7°48′N, 34°37′E, *Chaffey 908* (K). GABON: without locality, *Griffon du Bellay s.n.* (K);

Limbareni, May 1875, collector's name illegible (US); Tchibanga, *le Testu 1336* (BM). GHANA: 6 chs. from Akudum, *Ankrah 405* (US); Amuni, *Chipp 53* (K); Ashanti, *Cummins 84-164*; Pra Suhien Forest Reserve, *Deaw 363* (F, MO); Kade, Agricultural Research Station, *Enti s.n., GC-42033* (MO), *Ankrah s.n.*, Ghana Herbarium No. 20190 (K); Sekodumasi, *Kitson 8* (BM); E of Anyaboni at S edge of Afram Plains, *Morton 6095* (K); Dawo Mato Kola, *Thomas D-28* (K); Akatri, *Thomas D-90* (K); Atuna, *Vigne 3522* (BR). GUINEA: Bafing, *Adam 13795* (MO); 50 km de Kindia vers Mansu, *Roberty 10682* (G); Tèlimèlé nord, *Roberty 10775* (G). GUINEA-BISSAU: entre Sedengal e Ingone, *Espírito Santo Exploraçõ̃es Botânicas 3735* (US); Bedanda, *Pereira & Correia 2798* (K). INDIA: without exact locality, *Wight 2362* (G, K, PDA). KERALA: South Travancore, 2,000 ft., *Beddome 290* (BM, K); Vetillapara forest, Cochin, *Fernandez 12* (K); Courtallum, Tinnevelly District, *Wight 1353* (K, W). IVORY COAST: Duékoué, *Adam 6398* (MO); Duékoué-Buyo, fôret N du Nzo, *Bamps 2175* (BR); near Issia, Daloa–Abidjan road, *Boughey 13609* (K); Bingerville, *Chevalier 16036* (P); Amatioré Forest Reserve, 10 km W of Tiassalé, *Fosberg 40539* (MO, US); Yalé, near Mt. Nimba, *Geerling & Bokdam 1828* (BR, MO); 5 km N of Sassandra, *Leeuwenborg 2261* (BR, MO); N of Sékré, ca. 15 km E of Béréby, *Oldeman 604* (BR, K, MO); 10 km N of N'Douci, *Oldeman 701* (BR, MO); N'Zidah, *Roberty 13683* (G, MO); Dabou, *Roberty 15528* (G); N'Zo, *Roberty 16049* (G); Adiopodoumé, *de Wilde 861* (BR). LIBERIA: Diebla, Webo District, *Baldwin 6305* (K, MO, NY, US); Gbawia, *Baldwin 6714* (MO, NY, US); Gretown, Tchien District, *Baldwin 6924* (MO); Sanokwele, *Baldwin 9550* (MO); Kle, Boporo District, *Baldwin 10570* (K, MO); Wohmen, Vonjama District, *Baldwin 12027* (MO); hinterland of Monrovia, *Dinklage 3375* (BR); Ganta, Sanokwele District, *Harley 959* (MO); Peahtah, *Bequaert in Hb. Linder 1012* (K, US). NIGERIA: Itu, Cross River State, *Ariwaodo 83* (MO); Onitsha, *Barter 1814* (K, W); Obom Itiat, path to Atam Eki, Calabar Province, *Jones in F.H.I. 6870* (K); Olokemeji Forest Reserve, Abeokula Province, *Jones et al. in F.H.I. 14564* (MO, US); North-eastern: Ndoro District, Baissa Forest Reserve, *Latilo s.n.*, Forest Herbarium Ibadan No. 61439 (K); Ilaro Forest Reserve, 45 km SW of Abeokuta, *Lowe 4363* (K); Lagos, *Moloney s.n.* (K); Afi Forest Reserve, *Opara 836* (BR); Oban, *Talbot 856* (BM); Ibuzo, *Thomas 2010* (K). SENEGAL: Casamance, *Chevalier 2390* (P); Bignona, *Roberty 6424* (P). SIERRA LEONE: without exact locality, *Afzelius & Smeathman s.n.*; anno 1792–1796 (BM, S), *J. E. Smith s.n.*; anno 1791 ["Guinea"] (BM). Mt. Loma, *Adam 22422* (MO); Njala, *Dalziel 8420* (US); Kennema, *Deighton 397* (K), *Thomas 7822, 7903* (K); Kambia, *Deighton 838* (K); Heddle's Farm, *Elliot 3939* (BM, K, US); near Kambia, on Scarcies River, *Elliot 4389* (BM); Jola, 20 Jan. 1927, *Fairchild s.n.* (US); Zimi (Makpele), *Fisher 1* (K); Mabala, *Glanville 58* (K); Kambai Reserve, *Lane-Poole 344* (K); Kuntaia, *Thomas 441* (K); Yakala, *Thomas 2381* (K); Jigaya, *Thomas 2719* (K); Kanya, *Thomas 2983* (K). SRI LANKA: without definite locality, *C.P.* ["*Thwaites*"] *922* (BM, BR, G, K, W); Henaratgoda, 3 Jan. 1881, *Ferguson s.n.* (PDA, W); Matale, Dec. 1846, *Gardner s.n., C. P. 922* (PDA), Mar. 1883, *Lawson s.n.* (K); Buttala to Sirigala, 3 Mar. 1907, *Rock s.n.* (PDA); Dolukanda, *Senaratna 2700* (PDA); Dulva Kanda, *Tateoka 599* (B). SUDAN. EQUATORIA: Talanga, Imatong Mountains, 4°01′N, 32°45′W, *Friis & Vollesen 484* (BR, K); Lotti forest, *Myers 9655* (BM); Sakure, Zande Land, *Wyld 334* (BM). TANZANIA. ULANGA: Mangula to Kisawasawa, *Haerdi 624* (BR, G). TOGO: Tomegbé, *Brunel & Heitz 5837* (B); Cascade de Tomegbé, S of Badou, *Ern 2096* (B); Plateau de Danyi, zwischen Adéta und Ndigbe-Apédomé, *Ern 2703* (B, K). UGANDA: Damba Island, Kyagwe County, *Dawkins 459* (BM, K), *Maitland 801* (K); Gulu, Zoka forest, Acholi District, *Thomas 4031* (K). ZAIRE: Litendale, *Achten 485-A* (BR); Barumbu, *Bequaert 969* (BR); Avakubi, *Bequaert 1726* (BR); Mayumbe N'Benga, *Bittremieux 106* (BR); Menkao, *Breyne 918* (BR); Mabana, Maluku, *Breyne 3292* (BR, MO); Mayombi, *Brishe 31* (BR); Luni, *Brishe s.n.* (BM); Pansi, *Callens 2714* (BR); Lemba, route Luidi–Gombe Sud, *Compere 2077* (BR); M'Vuazi (Thysville), *Delhaye 24* (BR); Nkolo, M'Vuazi, *Devred 554* (BR); Lukolela, *Dewevre 544* (BR); Bas Uele, *Dewulf 331* (BR); INEAC, Luki, *Du Bois 333* (BR, K), *334* (BR); Zenge, Kasangula, *Dujardin 66* (BR); Mission de Kasinsi, Kwango, Bandunda, *Dujardin 183* (BR); Makamba, Bulungu, *Dujardin 491* (BR); Bingila, *Dupuis s.n.* (BR); Boyabokuda–Bogula (Badangabo), *Evrard 310* (BR); Djoa, Bolombo, *Evrard 4952* (BR); Tukpwo, *Gerard 2182, 4298* (BR); Ile Esali, Yangambe, *Germain 384* (BR, K), *Louis 6948* (B, BR), *7900, 13072* (BR); Panza, Inongo, *Gilbert 14213* (BR); Kisantu, anno 1900, *Gillet s.n.* (BR); Yambata, *de Giorgi 1669* (BR); Bolobo, env. Eala, *Goosens 2448* (BR); Karawa, Ubangi River, *Goosens 4123* (BR); Gatanga, *de Graer 294* (BR); Lisha, *Hens 156* (BR, G); Duma II, anno 1911, *van Keluom s.n.* (BR); Mutumbuta, 19 Apr. 1951, *Kimbau s.n.* (BR); Eiolo, 13 Nov. 1903, *Laurent s.n.* (BR); Lomkala, 26 Nov. 1903, *Laurent s.n.* (BR); Stanleyville, 15 Jan. 1904, *Laurent s.n.* (BR); Gimbi, *Laurent 600* (BR); Bolombo, *Lebrun 605* (BR, US); entre Businga et Banzyville, *Lebrun 2040* (BR, US); Moburasa, *Lemaire 193* (BR); Tambwe–Mwenza, Dibaya, *Liben 2694* (BR); Tuzule, riv. Lubi, *Liben 2976* (BR); Musoko, Luluabourg, *Liben 3507* (BM, BR); bord de la Lindi, 40 km N of Kisangani, *Lisowski 16480* (BR); Batiapanga, bord de la Mobi, 34 km SE of Kisangani, *Lisowski 17219* (BR); Lovanium, Kinshasa, *Lisowski 18349* (BR, K); 8 km N of Yakusu, *Lisowski 86435* (BR); Ile Booke wa Mbole, Yangambi, *Louis 10780* (BR, NY); entre Ngazi et l'Aruwimi, *Louis 12181* (BR); Tubeya Ilunga, rive droite de la Buchimaie SW de Kdakda Chefferie, *Luxen 369* (BR); Kisangani, *Mandango 3050* (BR); Loata, *Meurillon 23, 224* (BR); Yambata, *Montchal 136* (BR); Dundusana, *Mortehan 634* (BR); Kaniana–Haut Lomami, *Mullenders 472, 1226* (BR); Savane Makakumaka, Luki, *Nsimundele 57* (BR); Gimbi–Matadi, *Oldenhove 33* (BR); Kaparas, *Overlaet 418, 431* (BR); Mpangu, Kisantu, Terr. Popokabaka, *Pauwels 2360, 2388* (BR); Campus UNAZA (Lemba), Kinshasa, *Pauwels 6378* (BR); Epulu, *Putnam 50* (BR); Penge, *Putnam M-304* (BR); Mobwasa, *Reygaert 513, 1191* (BR); Nadibi–N'Iadinka, 28 June 1906, *Sapin s.n.* (BR); Boguge, près Mobwasa, *Thonner 138* (BR); Luki, vallée de la Minkudu, *Toussaint 2273* (BM, BR, M); Sonso, Kwango, *Vanderyst B-48* (BR); Kiala, Mar. 1907, *Vanderyst s.n.* (BR); Moyen-Kuolu, entre Yanda et Wemba, June 1907, *Vanderyst s.n.* (BR); Lazaret du Sacre-coeur, Kisantu, Apr. 1911, *Vanderyst s.n.* (BM, BR); Yindu, *Vanderyst 193* (BR); Kimuingu, *Vanderyst*

AFRICA No. 6

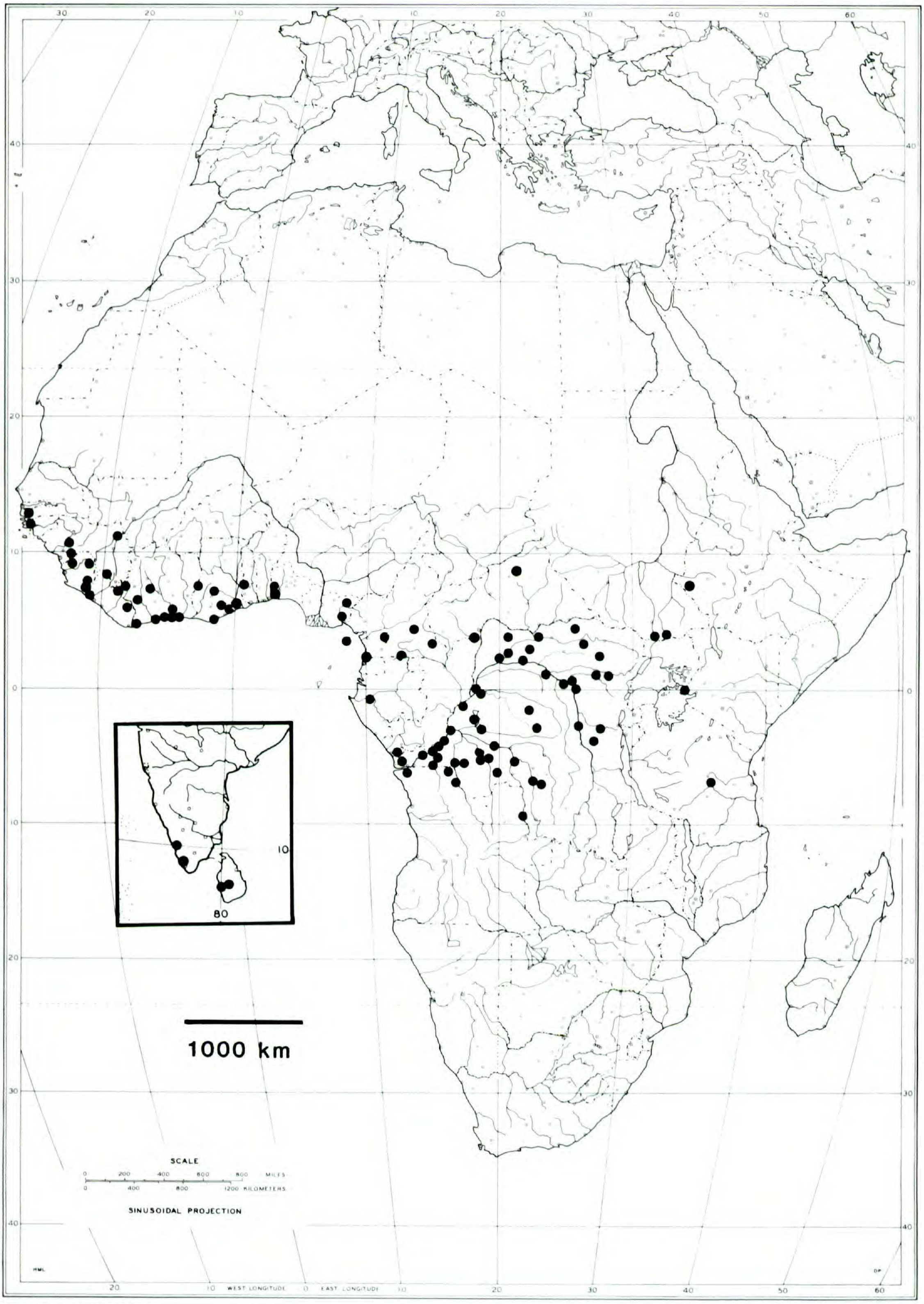

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FIGURE 5. Distribution of *Streptogyna crinita* in Africa; inset, distribution in Sri Lanka and southern India.

313 (BR); Dima, *Vanderyst 862* (BR); Iles du Kasai, *Vanderyst 993* (BR, US); Mokaba, *Vanderyst 1693, 3606* (BR); Kikwit, *Vanderyst 2783* (BR), *2913* (BR, MO), *9235* (BR); Mukulu, *Vanderyst 3191* (BR); Chenal, *Vanderyst 4502* (BR); Yanga, Apr. 1915, *Vanderyst s.n.* (BR); Kimpako, *Vanderyst 5429* (BR); Kisantu, *Vanderyst 5924, 20399, 29971, 29979, 32082* (BR); Tangu, *Vanderyst B-3* (BR); Ipamu, *Vanderyst 8709, 12941* (BR); Benga, Kisantu–Kwango, *Vanderyst 14432* (BR); Vuaha?, *Vanderyst 20926* (BR); Iona Bata, *Vanderyst 25681* (BR); Tsanga, *Vanderyst 26986* (BR); Wutu, Kipako, *Vanderyst 30696* (BR); Bokoimkori, *Vanderyst 32624* (BR); Lemfu, Apr. 1907, *Vantolborg s.n.* (BR); Yaleko-Opala, *Vos 35* (BR); Luki, *Wasemans 1018* (BR); Kigombe, *Wellens 245* (BR); Bongollo, anno 1893, *Zenker s.n.* (F); Likimi, [*collector's name illegible*] *216* (BR).

Streptogyna crinita is widely distributed in wet to seasonally dry forests from sea level to 1,000 meters elevation in tropical Africa (Senegal to southwestern Ethiopia south to Fernando Po, northern Angola, and central Tanzania), southern India (Kerala), and Sri Lanka (Fig. 5). Based on abundant collection data from Africa, *S. crinita* appears to flower all year, with a maximum during October through January and slight minima (as denoted by a small decrease in the number of flowering collections and a considerable increase in the number of sterile gatherings) during August and September and to a lesser extent February and March, although *Hens 156* states that the species flowers "toute l'année" in Zaire. Several collectors note that *S. crinita* may be locally dominant, covering the forest floor in large rhizomatous clones. The species is used in western Africa to catch mice and rats, the animals becoming entangled in inflorescences that are placed outside their holes (Hubbard, 1956). *Afzelius & Smeathman s.n.*, anno 1792–1796, gave the herbarium name of "Aristidoides muricida" ["awned mouse-killer"] to the plant.

2. Streptogyna americana C. E. Hubb., Hook. Icon. Plant. 36(6): 1–6, tab. 3572. 1956. TYPE. Suriname: trail to Coppename River, rear of village of Paka-Paka, *Maguire 23975* (holotype, K, not seen; isotypes, F, MO, NY). Figure 6.

Plant cespitose or rarely from a series of short, knotty, horizontal sympodial rhizomes up to 2.5 cm long, the erect culms representing aerial extensions of very short sympodial rhizomes, sometimes becoming decumbent and rooting at the lower nodes. Leaves clustered at base of plant, strongly overlapping, usually concealing all the nodes, often displayed in a fan-shaped arrangement; leaf sheaths glabrous below, ciliate on the margins, hispid at the summit; outer ligule 0.6–1.1 mm long, erose or with a smaller apical fringe of cilia; inner ligule 1.1–2.7 mm long; sheath auricles not developed; lateral appendages usually inconspicuous; oral setae not evident, 1–2 mm long; pseudopetiole not well differentiated from remainder of blade; leaf blades linear, 50–78 cm long, 0.8–1.6(–2.4) cm wide, glabrous, oblique, the midrib noticeably excentric, flat but often becoming inrolled; primary lateral veins 3–5 on each side of the midrib; upper (adaxial) blade surface dark green, the lower surface lighter green; cross-veins inconspicuous. Inflorescence 25–40(–67) cm long, borne on a peduncle 1–8-(–40) cm long; spikelets 14–25(–49), the glumes of adjacent spikelets not or only slightly overlapping; rachis subglabrous below, appressed-pubescent above. Spikelets 4–6 flowered, borne on pedicels 1–3 mm long; first glume 3–12 mm long, linear to lanceolate, glabrous, 1–3(–5)-nerved; second glume 10–16 mm long, 1.1–1.7 mm wide, ovate-lanceolate, (5–)7–9-nerved, with scattered inconspicuous transverse veinlets and an awn up to 3 mm long; lemma of lowest floret 19–24 mm long, narrowly lanceolate, completely glabrous, the (5–)7(–9)-nerves green, evident on the inner surface but not visible on the granular outer surface except near the summit of the body; calluslike prolongation of lemma 1–2 mm long, the terminal awn 12–21 mm long, arising from between 2 inconspicuous teeth at the summit of the body of the lemma; rachilla internode attached to lowest floret, persistent, 4–6 mm long; palea slightly longer than the lemma, usually protruding from it by 0.5–3 mm; lodicules narrowly lanceolate, firmly membranous and strongly nerved below, often abruptly widening about ⅓ of the way from the base, then tapering in the upper ⅔ to an attentuate, nerveless, hyaline apex, this usually fringed with prickles or occasionally with a few cilia, microhairs absent; anterior lodicules 3.2–6 mm long, 0.5–1 mm wide, 1–3(–5)-nerved, the posterior lodicule often slightly shorter and narrower, 1(–3)-nerved; anthers 2.5–3.5 mm long, narrowly linear; ovary glabrous; stigmas 3, lacking coarse barbs, glabrous below, at maturity hispidulous-papillose adaxially near the summits; caryopsis 14–17 mm long, 1–1.2 mm wide, glabrous.

Additional specimens examined. BELIZE: Cohune ridge, Sapon road, *Gentle 8121* (BM, F, G, NY, S, US); Cohune ridge, hill slope, Hummingbird Highway, *Gentle 8682* (BM, F, G, NY, S, US); 40 miles section

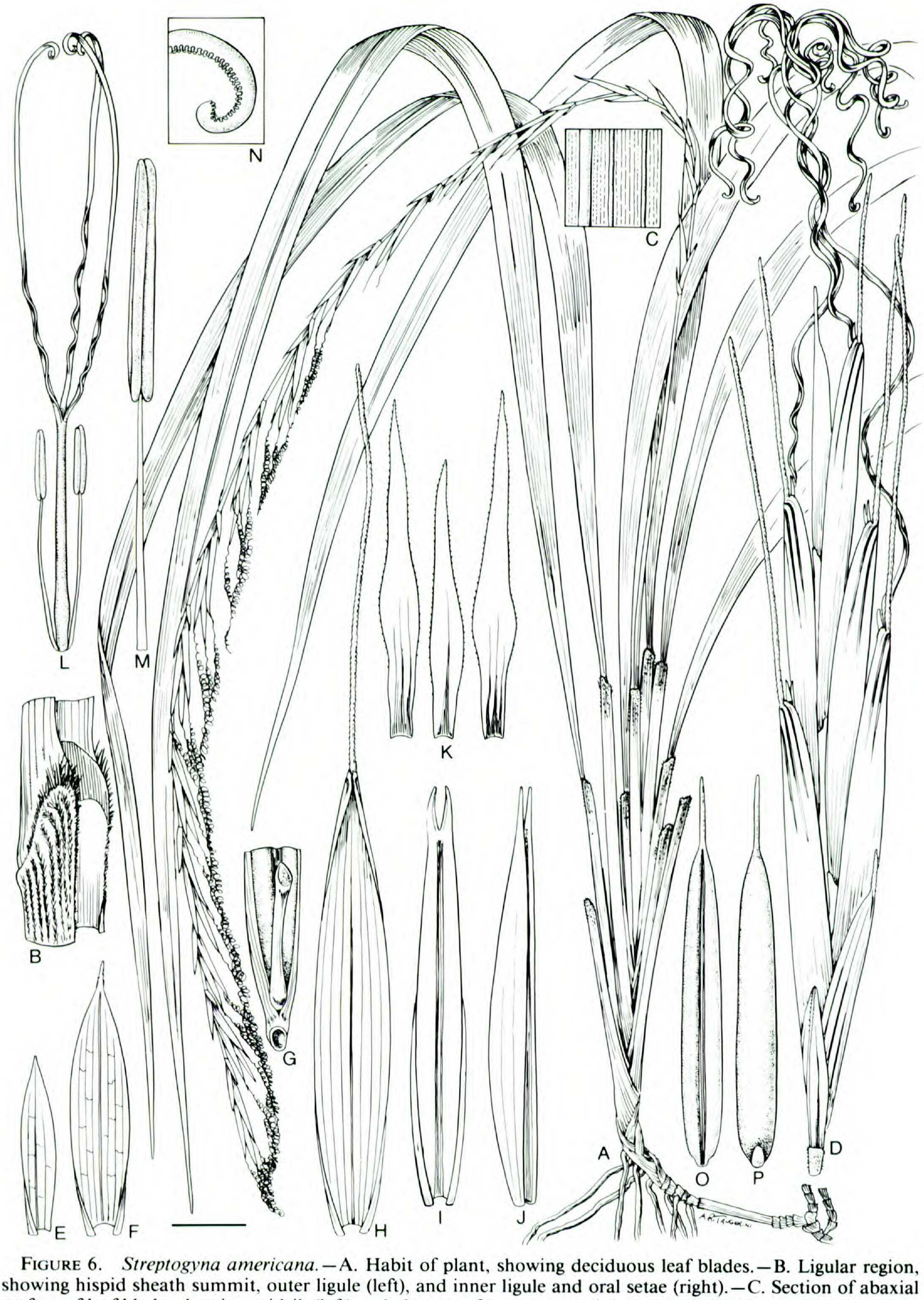

FIGURE 6. *Streptogyna americana*.—A. Habit of plant, showing deciduous leaf blades.—B. Ligular region, showing hispid sheath summit, outer ligule (left), and inner ligule and oral setae (right).—C. Section of abaxial surface of leaf blade, showing midrib (left) and absence of transverse veinlets.—D. Spikelet.—E. First glume.—F. Second glume.—G. Base of floret, showing basal prolongation of lemma and persistent rachilla internode.—H. Lemma, unrolled, showing inner surface.—I. Palea, ventral surface.—J. Palea, profile.—K. Lodicules, with posterior member in center.—L. Androecium of two stamens and gynoecium.—M. Stamen.—N. Stigma, showing

Hummingbird Highway, *Gentle 9005* (S, US). BOLIVIA. BENI: Alto Ivon, 11°45′S, 66°02′W, *Boom 4792* (NY), *4827* (MO, NY, US); 18 km E of Riberalta, 11°05′S, 65°50′W, *Solomon 6169, 7801* (MO). BRAZIL. ACRE: 125 km from Rio Branco on road to Pôrto Velho, 9°45′S, 66°20′W, *Calderón & Soderstrom 2301* (US). AMAPÁ: Rio Jari, near Cachoeiras das Guaribas, 0°24′N, 53°07′W, *Egler & Irwin 46417* (NY, US); road to Amapá, vicinity of km 108, Rio Pedreira, *Pires & Cavalcante 52222* (MO, NY, US); Serra de Tumac-Humac via Rio Cuminá, *Sampaio 5562* (US); Mitaraka S, crête W, 2.5 km sommet, *Sastre 1656* (CAY, P, US). BAHIA: Parque Nacional de Monte Pascoal, 16°54′S, 39°24′W, *Calderón & Pinheiro 2204* (CEPEC, US); 19 km N of Esplanada City on road to Jaquera, *Calderón et al. 2410* (B, NY, US); Monte Pascoal, 14 km E of BR-101 at point 13 km N of Itamarajú, *Soderstrom et al. 2193* (CEPEC, US). ESPÍRITO SANTO: Reserva Florestal de Linhares, 19°24′S, 40°04′W, *Martinelli & Soderstrom 9757* (RB), *Soderstrom & Sucre 1883* (CEPEC, US). MARANHÃO: Fazenda Bacaba, Doctor Haroldo, 5 km S of MA-119 from entrance 3 km NW of Lago do Junco, 4°26′S, 44°58′W, *Daly et al. 469* (MO, NY); Rio Pindaré, Monção, *Fróes 20312* (US); Caxias to Barra do Corda, before Curador [Pres. Dutra], *Swallen 3583* (US). MATO GROSSO: Fazenda Az de Ouro, 14°13′S, 57°02′W, *Amaral 9* (RB); 260 km along road NNE of Xavantina, a few miles W of base camp at 12°51′S, 51°45′W, *Eiten & Eiten 8903* (US); 5 km NW of base camp, 12°49′S, 51°46′W, *Harley & Souza 10271* (US); 8 km NE of base camp, *Ratter et al. 974* (NY, US); 4 km N of base camp, *Ratter et al. 1820* (K, NY, US); Serra do Itapirapuan, Alfonso, *Lindman A-3347*; Sararé, 15°05′S, 59°50′W, *Pires & Santos 16316* (MO, NY). PARÁ: Belterra, *Black 47-936* (NY); inter São João et Santa Anna, *Burchell 9201* (BR, US); Rio Parú de Oeste (TIRIOS), *Cavalcante 824* (US); Gorotire village at Rio Fresco, 7°47′S, 51°07′W, *Gottsberger & Posey 17-22183, 32-24183* (MO); Curuá Alemquer, *Kuhlmann 1725* (US); Maicurú, São Francisco, *Pires & Silva 4262* (NY, US); Serra Buritirama entre B-2 e B-3, Marabá, *Pires 12320-A* (US); range of low hills ca. 20 km W of Rendenção, near Côrrego São João and Troncamento Santa Teresa, 8°03′S, 50°10′W, *Plowman et al. 8645* (F, MO, NY, US); 100 km S of Rendenção on road to Barreiras dos Campos: Fazenda Inajapora between Rio Inajazinho and Rio Inajá, ca. 8°45′S, 50°25′W, *Plowman et al. 8883* (F, MO, NY, US); Belém–Brasília Highway 17 km S of Ligação do Pará, near km 1,509, ca. 4°17′S, 47°32′W, *Plowman et al. 9409* (F, MO, NY, US, WIS); 6 km N of Ligação do Pará, near km 1,532, 4°05′S, 47°32′W, *Plowman et al. 9522* (MO); 12 km E of Reprêsa Tucuruí (Rio Tocantins), 3°45′S, 49°40′W, *Plowman et al. 9799* (NY); Jari, estrada do Munguba, km 14, *Silva 2198* (MO, NY); Lageira, airstrip on Rio Maicurú, 0°55′S, 54°26′W, *Strudwick & Sobel 3109* (F, MO, NY); Sete Varas airstrip, Rio Curuá, 0°59′S, 54°29′W, *Strudwick & Sobel 4289, 4313* (F, MO, NY); Santarém, *Swallen 3281* (US); Japanese concession 35 km N of Monte Alegre, *Swallen 3411* (US); Óbidos, *Swallen 5089* (US). PERNAMBUCO: Escada, Eng. Conceição, *Andrade-Lima 67-5038* (F). RONDÔNIA: Guajará-Mirim, Ponto 19, *Cordeiro 924* (MO); 1 km N of Riberão, road Abunã–Guajará-Mirim, *Prance et al. 6454* (MO, NY, US), *6527* (F, MO, NY, S, US); in sylvis umbrosis ad flumen Guaporé, *Riedel 1248* (G, NY); Mineração Mibrasa, setor Alto Candeias, km 128, 10°35′S, 63°35′W, *Teixeira et al. 625* (MO). RORAIMA: Conceição, Rio Blanco, *Luetzelburg 21383* (M). COLOMBIA. CAQUETÁ: Entre Puerto Rico y San Vicente del Caguán, hacienda Las Palmas, *Cabrera 3629* (F). META: E de San Martín, N del Caño Camoa, *Blydenstein 1687* (US); Monte de Caño Camoa, *Hermann 11186* (US); sabanas de San Juan de Arama, margen izquierda del Río Güejar, aterrizaje "Los Micos," *Idrobo & Schultes 608, 1217* (US); margen izquierda del Río Sansa, Sierra de la Macarena, *Idrobo 2160* (NY); Caño Ciervo, Sierra de la Macarena, *Philipson et al. 2023* (BM, S, US); margen derecha del Río Guayabero, Raudal de la Macarena (Angostura 1), *Pinto & Bischler 334* (US). VICHADA: ca. 35 km from Las Gaviotas on road to Santa Rita, *Davidse & Llanos 5211* (MO); Gualandayas, ca. 100 km E of Gaviotas, *Wood 4220* (K). COSTA RICA. PUNTARENAS: Finca Los Helechales, between Buenos Aires and Cerro Pittier, *Hatheway 1686* (US); Los Tejares de Buenos Aires, *Pittier 10602* (BR, M, US, W); entre le Río del Convento et Buenos Aires, *Tonduz 3643* (BR, W). FRENCH GUIANA: vicinity of Cayenne, hill above Grant's Road, *Broadway 771* (NY, US); Haut Tampoc: Saut Awali, *Cremers 4546* (CAY); Tumac-Humac, Koulimapopann-Mitaraka (frontière) P.K. 7.5, *Granville 1139, 1417* (CAY, US); versant N des Monts Galbao, 10 km WSW de Saül, 400 m, *Granville 1621* (CAY); 14 km de Dégrad Claude, *Granville 2267* (CAY); Sommet Tabulaire, ca. 50 km SE Saül, *Granville 3586* (CAY, MO, US); Chemin des Emérillons, 1 km de Saut Verdun, *Granville B-5037* (CAY); Cayenne, Chemin du Moulin Vidal, 13 July 1955, *Hoock 1187* (K, P); Saül, 30 June 1956, *Hoock s.n.* (NY); Cayenne, anno 1839, *Leprieur s.n.* (G), anno 1866, *Jelski s.n.* (W); Montabo, *Herb. L. C. Richard s.n.* (W); Karouany, *Sagot 1076* (BM, W). GUATEMALA. ALTA VERAPAZ: ca. 6 km E of Sebol on San Luis Road to Achiote, *Contreras 4486* (US). IZABAL: ridge N of Quiriguá, *Weatherwax 104* (US). GUYANA: Wabuwak, *Wilson-Browne 476* (K, NY). MEXICO. CHIAPAS: Javalinero, Palenque, *Matuda 3637* (F, US). VERACRUZ: Sanborn [ca. 17°34′N, 95°07′W], *Orcutt 2933* (K, MO, US). NICARAGUA. ZELAYA: region of Braggman's Bluff, *Englesing 218* (F); Miguel Bíkan, ca. 52 km SE of Waspám, *Pohl & Davidse 12310* (F, ISC). PANAMA. CANAL AREA: Barro Colorado Island, *Calderón 2098, 2148* (US), *Croat 4343, 8585, 8609, 8619* (MO), *9436* (MO, NY), *13214-A, 14019-A* (MO), *Foster 2305* (F), *Judziewicz 4436* (MO, WIS), *Shattuck 530* (F, MO), *Standley 41159* (S, US); Indio, Madden Lake, *Miller 2045* (US); hills N of Frijoles, *Standley 27480* (MO, US); forest along telephone cable trail

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adaxial papillae near tip.—O. Caryopsis, ventral surface showing linear hilum.—P. Caryopsis, dorsal surface showing small, basal embryo. (Based on Brazil, *Soderstrom et al. 2193* (US). Scale bar = 24 mm for A; 4 mm for C–F, I, J, L, O, P; 2 mm for B, G, H; 1 mm for K, M; and 0.5 mm for N.)

FIGURE 7. Distribution of *Streptogyna americana*.

between S-16 and S-49, Río Indio, *Steyermark & Allen 17459* (BR, G, MO, S, US). DARIÉN: Cerro Pirre, *Gentry & Clewell 7147* (MO), *Mori & Kallunki 5374* (MO, US); 0.5–2.5 km NE of Manené, *Hartman 12175* (MO). PANAMÁ: San José Island, *Johnston 433* (BM, US), *728, 1115* (US). PERU. MADRE DE DIOS: Río Tambopata, Lago 3 Chimbadas, ca. 65–70 river km SSW of Puerto Maldonado, ca. 10–15 km air SW effl. Río La Torre, 12°49′S, 69°17′W, *Barbour 5762* (MO). SURINAM: without locality, *Weigelt s.n.* (W); Zuid River, 3 km above confluence with Lucie River, *Irwin et al. 55900* (B, MO, NY, US); ab Wia wia-bank ad Grote Zwiebelzwamp, *Lanjouw & Lindeman 1153* (NY); Rikanau prope Moengo, *Lindeman 6090* (F); Brownsberg, near Irene fall, *Lindeman 12084* (K, NY); Lucie River, ca. 2 km below affluence of Oost River, *Maguire et al. 54093* (NY, US); Avanavero oever, *Stahel & Boonacker 4579* (US). TRINIDAD: without locality, *Botanical Garden Herbarium No. 3367* (US), *Crueger 362* (US fragment), *Finlay 3* (K, W); Caparo forests, *Broadway 4932* (US); Tabaquite, edge of High Woods, *Hitchcock 10122* (BM, US). VENEZUELA: Alto Orinoco, *Rusby & Squires 349* (K, NY). AMAZONAS: vicinity of Culebra, Río Cunucunuma, 3°40′N, 65°45′W, *Steyermark & Delascio 129185* (MO); Mavaca, Alto Orinoco, *Aristeguieta & Lizot 7380* (NY). BOLÍVAR: alrededores km 88, carretera El Dorado, *Aristeguieta 3713* (MO); 17 km W of Río Caura on road between Caicara and Ciudad Bolívar, *Davidse 4443* (MO, WIS); 10 km SW of Río Aro on road between Caicara and Ciudad Bolívar, *Davidse 4476* (MO); km 28, S of El Dorado, *Davidse 4966* (MO); 20–35 km SE of Monteco on road to San Pedro de las Dos Bocas, 7°10′N, 62°55′W, *Liesner & Gonzalez 5851* (MO); along pica 105, 40 km S of Tumeremo, 29 km N of El Dorado, *Steyermark 86572* (NY); Pica La Lira, at km 27 S of El Dorado, 1–6.5 km E of highway, *Steyermark 86638* (NY); woods bordering savannah by Río Asa, above raudal Cotua, S of La Paragua, *Steyermark 86760* (US). DELTA AMACURO: 3 km N of Piacoa [probably in the state of Delta Amacuro], *Steyermark 86277* (F, NY); E side Río Cuyubini, Cerro La Paloma, *Steyermark 87653* (NY). SUCRE: S slopes of Cerro Imposible, between Cedeño and Boca del Tataricual, along Quebrada Imposible, *Steyermark 62845* (F, US).

Streptogyna americana is found in shaded, well-drained sites in moist forests below 500

(–800) meters from Veracruz, Mexico, and Trinidad south to northern Bolivia and Espírito Santo, Brazil (Fig. 7). Most common on the margins of the Guyana Highlands and in easternmost and southernmost Amazonia, this species is rare or absent in the central portion of the Amazon Basin. Collectors in Panama (*Judziewicz 4440*), Venezuela (*Davidse 5211*), and Surinam (*Irwin 55900*) noted that the leaf blades become inrolled during hot dry weather or soon after collection. Most Central American collections were made November through April, indicating a dry season peak of bloom, while Guyanan and eastern Amazonian collections have been made principally June through August; the five Atlantic Brazilian gatherings were made from March to May. Common names of *S. americana* include "barba de paca" (*Ratter et al. 1820,* Brazil) and "barbatigre" (*Cabrera 3629,* Colombia), suggesting external animal dispersal.

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APPENDIX I.

LIST OF TAXA CITED

Arundinaria vagans Gamble
Bambuseae Kunth
Bambusoideae Nees
Danthonia DC
Diandrolyra tatianae Soderstrom & Zuloaga
Guaduella Franchet
Joinvillea Gaudich.
Joinvilleaceae Tomlinson
Maclurolyra tecta Calderón & Soderstrom
Olyra latifolia L.
Pariana parvispica R. Pohl
Pleioblastus Nakai
Sasa Makino & Shibata
Streptia crinita Rich. ex Doell
Streptia secunda Rich. ex Doell
Streptogyna P. Beauv.
S. americana C. E. Hubb.
S. crinita P. Beauv.
S. gerontogaea Hook. f. in Trimen
Streptogyneae C. E. Hubb. ex Soderstrom & Calderón